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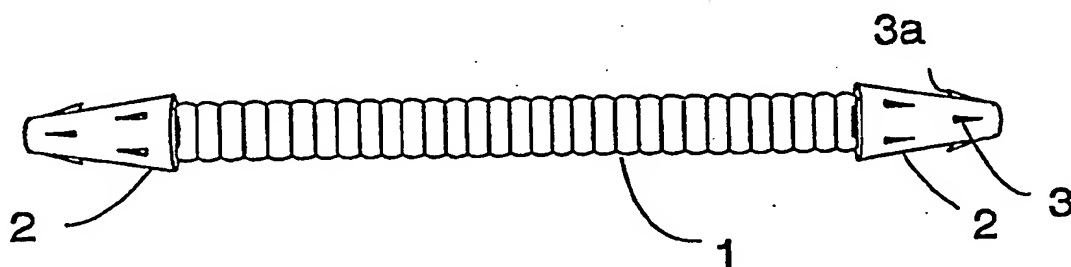
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(54) Title: CONNECTOR FOR STOPPING BLEEDING FROM SEVERED BLOOD-VESSELS



(57) Abstract

The connector is made from a resilient and flexible tubular portion (1), each end of said tubular portion (1) being provided with a connecting portion (2) which tapers towards its free end. The connecting portions (2) are intended to be inserted into the ends of a severed blood-vessel so as to form a channel between the ends of the blood-vessel to allow blood to flow between them.

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## Connector for stopping bleeding from severed blood-vessels

5 The invention relates to a connector for stopping bleeding from severed blood-vessels.

When large blood-vessels are severed in accidents, the injured person usually dies, since bleeding cannot be properly stopped by normal means, and medical treatment is seldom immediately available. It is particularly problematic that the people on the scene do not usually know how to help.

10 To keep an injured person alive, it is absolutely crucial to stop bleeding, which is, however, rather difficult to do by merely closing the blood-vessel in question by pressing it. Moreover, closing a vessel from which blood wells out may damage the limbs or organs which no longer receive blood.

20 The object of the present invention is to provide a connector for temporarily stopping bleeding from large severed blood-vessels and for maintaining the necessary circulation. The connector according to the invention is characterized by comprising a resilient and flexible tubular portion, each end of said tubular portion being provided with a connecting portion which tapers towards its free end, said connector being intended to be inserted at both of its ends into the ends of a severed blood-vessel so as to form a uniform channel between the severed ends of the blood-vessel to allow blood to flow between them.

30 An essential feature of the invention is that the connector which is to be positioned between the ends of a blood-vessel comprises a resilient and flexible tube each end of which is provided with a connecting portion which tapers towards its free end; the connecting portions can be inserted into each end of the

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severed blood-vessel so as to form a temporary channel between the ends of the blood-vessel. Another essential feature of the invention is that the connecting portions comprise gripping means, which grip the injured part so that the connector remains in place until the patient is brought to medical treatment.

In the following, the invention will be described more closely with reference to the accompanying drawings, in which

Figure 1 is a schematic view of the connector of the invention in a straight position, and

Figure 2 is a schematic view of the connector of the invention when bent into a loop, and

Figures 3a and 3b illustrate other embodiments of the invention.

The connector shown in Figures 1 and 2 is formed from a resilient and flexible tubular portion 1, which is preferably a so-called accordion tube made from thin plastic or the like. In this way it is possible to provide a highly resilient and flexible tubular portion 1 the inside of which forms as large a channel as possible.

Both ends of the tubular portion 1 are provided with a connecting portion 2 which tapers towards its free end. The connecting portion 2 is provided with gripping means 3. In the case illustrated in the figures, a plurality of gripping means 3 are disposed around the connecting portion in two series in the longitudinal direction of the connecting part.

When a person is injured in such a way that one of the large blood-vessels is severed, the connecting portion 2 of the connector is inserted at first into that end of the blood-vessel which bleeds more. The connecting portion is inserted so deep that the wedgelike, projecting gripping means 3 keep it

stationary within the vessel. Thereafter blood is allowed to flow through the connector so that air is completely removed, whereby the risk of air bubbles is obviated. When the connector is full of blood, the connecting portion at its other end is inserted into the other end of the severed vessel in a corresponding manner, so deep that it remains tightly in place; blood starts to flow through the connector from one end of the vessel to the other, and circulation continues without substantial bleeding. After the connector has been inserted in place, the patient has a better chance to survive, and there is more time to take him to a hospital or the like, where a doctor may perform the surgical manipulations of the wound. It is self-evident that the connector should not be removed until it is possible to provide the necessary treatment. The gripping means 3 should therefore be implemented so as to ensure a secure grip. As can be seen from the figures, the gripping means 3 are barbed: they comprise a sharp barbed point 3a extending from the end of the connecting portion 2 towards the tubular portion 1. Once the connecting portion 2 is inserted into a vessel, the points 3a dig into the tissue, securing the connecting portion thereto. It is thus impossible to remove the connecting portion without violence; the connecting portion is therefore intended to be removed only by the attending doctor.

Figure 2 illustrates schematically how the connector of the invention can be bent into a loop, for example, to allow it to be suitably secured to the ends of a severed blood-vessel. Such connectors may be manufactured in different sizes; the suitable connector is then selected according to the size of the damaged vessel.

Figures 3a and 3b illustrate two other embodiments of the invention; these embodiments differ in the shape of the connecting portion and in the gripping means. Figure 3a shows one end of a connector where the connecting portion has an even outer surface. To allow the connector to be secured to a patient's tissue, a support portion 4 is provided behind the connecting portion 2; the support portion 4 may be a plate, a grate, or merely a rod-like object. The support portion 4 is provided with gripping hooks 5 extending from the support portion 4 towards the tip of the connecting portion 2. According to this embodiment, the connector is secured to a patient's tissue by hooks 5, which keep the connector stationary.

In the above and in the drawings, the invention is described merely by way of example; it is to be understood that the invention is by no means restricted to this example. The connecting portion 2 must be tapered so that its narrow end can be inserted into a blood-vessel. The connecting portion 2 may be conical or of some other shape. The end of the connecting portion 2 which faces the tubular portion may be abrupt as illustrated in Figures 1 and 2, or it may be shaped differently. The shape and structure of the tubular portion may vary. The tubular portion is preferably made of a transparent material so that any air bubbles can be detected before the connector is secured to the blood-vessel.

## Claims

1. A connector for stopping bleeding from severed blood-vessels, characterized by comprising a resilient and flexible tubular portion (1), each end of said tubular portion (1) being provided with a connecting portion (2) which tapers towards its free end, said connector being intended to be inserted at both of its ends into the ends of a severed blood-vessel so as to form a uniform channel between the severed ends of the blood-vessel to allow blood to flow between them.

2. A connector according to claim 1, characterized by comprising gripping means (3) intended to dig into a patient's tissue when the connecting portion (2) is inserted into a blood-vessel to ensure that the connecting portion (2) remains stationary within the end of the blood-vessel.

3. A connector according to claim 2, characterized in that the gripping means are barbs disposed on the outer surface of the connecting portion (2), said barbs comprising a sharp point (3a) extending from the tip of the connecting portion (2) towards the tubular portion (1) so that when the connecting portion (2) is inserted into a blood-vessel, the points grip the inner surface of the blood-vessel.

4. A connector according to claim 2, characterized in that the gripping means are hooked elements mounted around the connecting portion (2) apart therefrom to grip the tissue surrounding the blood-vessel.

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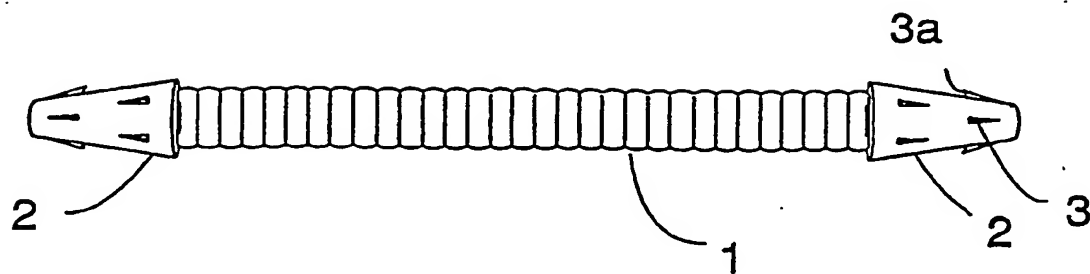


FIG. 1

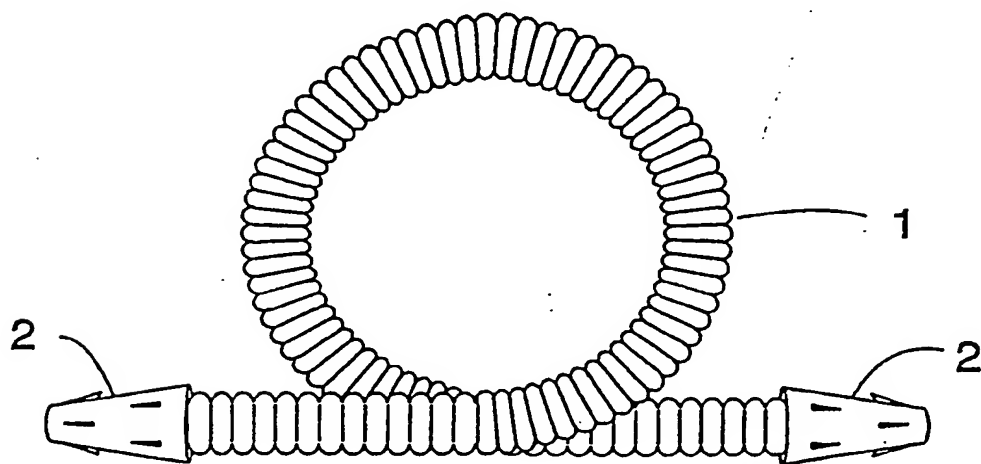


FIG. 2

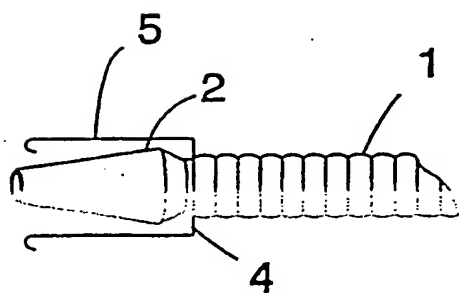


FIG. 3a

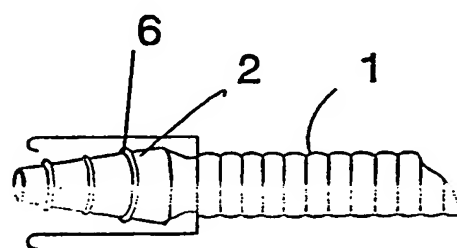


FIG. 3b



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 94/00497

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A61F 2/06, A61B 17/11

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A61B, A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

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## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P	DE, A1, 4221087 (GERCKE, HANS-HERMANN), 5 January 1994 (05.01.94), column 2, line 32 - line 34, figures 1-2 --	1-2
X	US, A, 3221746 (J.W. NOBLE), 7 December 1965 (07.12.65), column 2, line 11 - line 33, figure 1 --	1-3
X	US, A, 3938528 (LOUIS BUCALO), 17 February 1976 (17.02.76), column 5, line 47 - line 53, figures 3-4 --	1-3
A	US, A, 3683926 (JIRO SUZUKI), 15 August 1972 (15.08.72), figures 2C-2E --	1-2

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 5192289 (JOHN W. JESSEN), 9 March 1993 (09.03.93), figures 1-2  -- -----	1-2

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

31/12/94

International application No.

PCT/FI 94/00497

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
DE-A1-	4221087	05/01/94	NONE		
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			JP-A-	50027392	20/03/75
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			US-A-	3884239	20/05/75
			US-A-	3931820	13/01/76
			US-A-	3938499	17/02/76
			US-A-	3951132	20/04/76
US-A-	3683926	15/08/72	NONE		
US-A-	5192289	09/03/93	NONE		